



Part 1. Conserving Washington's Natural Biological Diversity

Many people think of biological diversity simply in terms of the number of species of plants, animals and other organisms that inhabit the world. But conservation biologists view biological diversity as more complex, encompassing other levels of biological organization. In this more complex view, the concept includes genetic diversity within each individual species. It also includes the diversity of ecosystems and landscapes that surround us.

Washington is rich in natural biological diversity at all of these levels. Although a complete catalogue of native species for the state has not been compiled, there are more than 3,100 species of vascular plants, as well as hundreds of species of mosses, lichens and liverworts, and thousands of species of fungi. There are approximately 675 vertebrate species within our borders, of which about 300 are birds, 140 are mammals, and 80 are fish. A conservative estimate of the number of terrestrial and aquatic (including marine) invertebrate species is 20,000. Approximately 2,000 of these are butterflies and moths.

This richness in species diversity is due to the tremendous variety of habitats within the state. The combination of geologic history and dramatic changes in physical characteristics of the environment (such as elevation and precipitation) over relatively short geographic distances creates this variety of habitats.

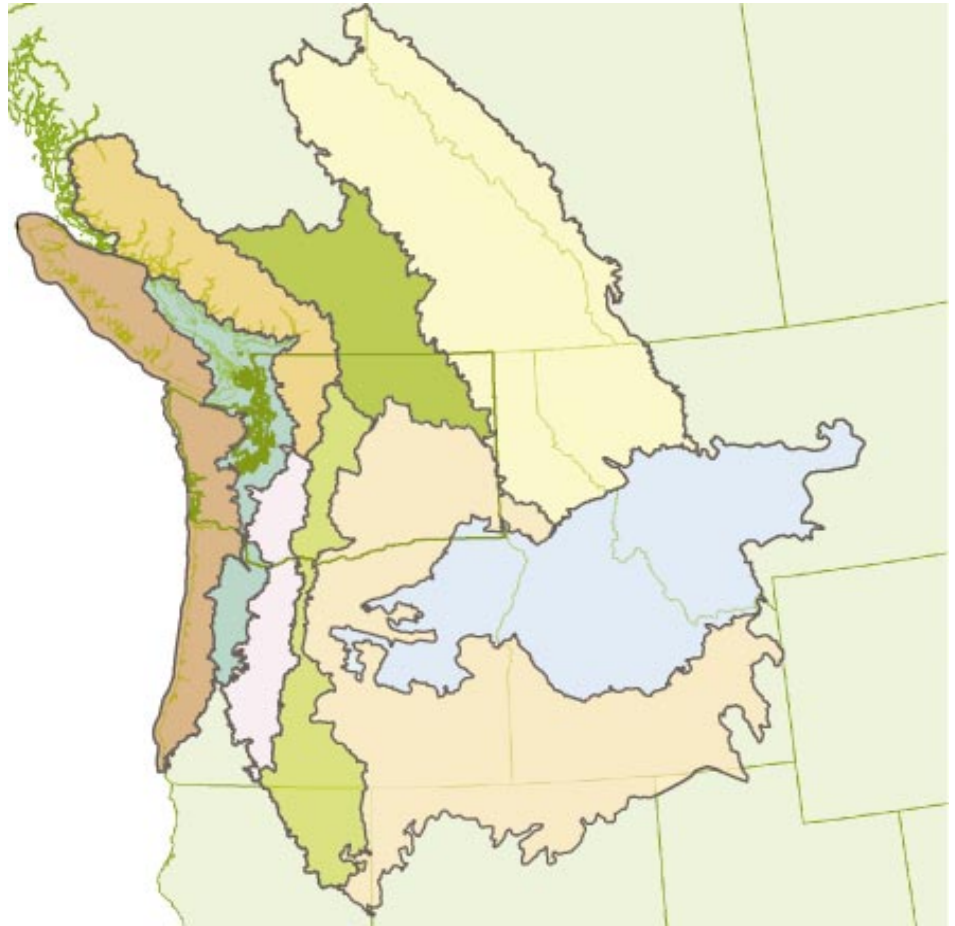
Ecologists look at the diversity of habitats and see patterns in the way that species, and groups of species, are distributed. They identify groups, or assemblages, of species that consistently co-occur in defined areas. These “ecological communities” include unique interactions among species and significantly influence ecosystem function and species evolution. The Natural Heritage Program currently recognizes 250 of these ecological communities as priorities for conservation. This is a subset of more than 800 recognized plant community and wetland types in Washington.

Figure 1. Ecoregions of Washington

Ecoregions are delineated based on ecological patterns on the landscape. As a result, they cross political boundaries. There are portions of nine ecoregions within Washington.

ECOREGIONS

- Pacific Northwest Coast
- Puget Trough
- North Cascades
- West Cascades
- East Cascades
- Okanogan
- Canadian Rockies
- Blue Mountains
- Columbia Plateau



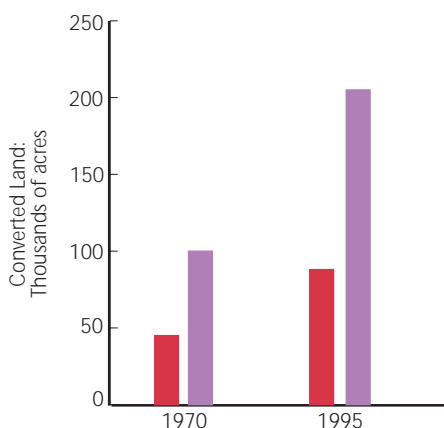
At an even larger scale, ecologists look at the diversity of ecosystems and see patterns in how they are distributed over the landscape. That is, there are broad ecological patterns in vegetation, soils, geology, hydrology, landforms and natural disturbances, such as fire. These broad ecological patterns on the landscape have been delineated geographically as “ecoregions.” This concept is increasingly used for conservation planning purposes. It provides an ecological basis for partitioning the state into manageable subunits. The use of this concept has been adopted in this edition of the *State of Washington Natural Heritage Plan*. Figure 1 depicts the ecoregions in Washington. More information is presented in “Part 4. Ecoregions of Washington.”

Threats to Washington's Biological Diversity

In 1972, the Legislature recognized that human activities have the potential to threaten our native species and ecosystems. Loss of habitat is the greatest overall threat. For example, land use in the Puget Sound region for industrial, commercial, residential and agricultural development has resulted in conversion of more than 50 percent of the area from native vegetation to other types of ground cover (concrete, asphalt, non-native vegetation, etc.). Also, more than 50 percent of Washington's portion of the Columbia Plateau has been converted to agricultural development. In the Palouse region, greater than 90 percent of the land has been converted to agricultural use.

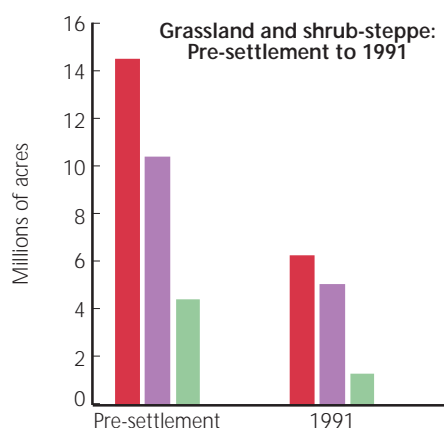
Habitat degradation is also a major concern. Qualitative changes in habitat can threaten vulnerable native species and ecosystems. Many land-use activities can negatively affect the quality of habitat, rather than resulting in its outright elimination. For example, excessive grazing, incompatible timber management activities, outdoor recreational activities and many other land-use activities have the potential to result in compacted soils, changes in hydrologic processes and increased invasion of non-native weeds.

The overall spatial pattern of remaining examples of quality habitat is also critical for many native species and ecosystems. Patches of suitable habitat must be large enough to support the species or ecosystems of interest. There also must be enough suitable patches in reasonable proximity to each other to ensure viability. As the habitat for a species – or the area occupied by a particular ecosystem type – becomes more fragmented, and the remnants become isolated from each other, the likelihood of long-term survival decreases.



■ Business
■ Housing

Figure 2. Habitat conversion in the Puget Trough. Population growth in the Puget Sound Region over the last three decades has resulted in significant conversion of habitat to residential and business uses. Data source: Washington State Department of Transportation, 1998.



■ Total
■ Shrub-steppe
■ Grassland

Figure 3. Habitat conversion in eastern Washington. Conversion of shrub-steppe and grassland habitats to agriculture in eastern Washington has resulted in a significant reduction in habitat availability for species dependent on those habitats. Data source: GAP Analysis of Washington State, 1997.

THREATS TO BIOLOGICAL DIVERSITY

- Loss of habitat – conversion to other uses:
 - commercial
 - industrial
 - residential
- Degradation of habitat – decrease in quality and/or loss of ecological processes or functions. Examples:
 - weed invasions
 - altered hydrology
 - fire suppression
- Isolation and fragmentation of suitable habitat:
 - habitat patches becoming too small
 - loss of gene flow between populations
 - increased likelihood that chance events (fire, flood, etc.) will be detrimental

► **Loss of Habitat:** Conversion of land to residential, commercial, industrial and agricultural uses results in the loss of habitat for native species and ecosystems.

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► **Habitat Degradation:** Non-native species, such as diffuse knapweed, can negatively affect the quality of habitats for native species and ecosystems.



► **Isolation and Fragmentation:** Remaining native habitats in the Palouse region are primarily limited to small, isolated fragments that are too steep to plow. Such remnant fragments are often too small to support viable populations of native species.



Conservation Tools

Although the threats faced by our native species and ecosystems are great, a number of conservation tools are available. Education is the most fundamental tool. Landowners and land managers need to know three basic things:

- Why it is important to conserve biological diversity.
- Which species and ecosystems are of conservation concern.
- What they can do as land managers to conserve biological diversity.

In many instances, conservation can be achieved through ecologically sound land management practices. For species or ecosystems that are more sensitive to land management practices, establishment of natural areas may be the best tool for conservation. Various laws, regulations, and voluntary mechanisms are also in place to help conservation efforts. All of these tools must be employed if success is to be achieved.

More agencies, groups and individuals are involved in conservation planning and conservation action today than 10 or 20 years ago. Regional and local conservation groups, and land trusts, have emerged and are active in setting conservation priorities and acquiring land or easements for conservation purposes. There are also conservation efforts being led by natural resources industry groups.

More collaboration also occurs today than in the past. The Nature Conservancy has spearheaded an effort to create conservation plans for each ecoregion. The Washington Department of Fish and Wildlife (WDFW), DNR (through the Natural Heritage Program) and other agencies are full participants in this planning effort. Because ecoregions cut across state and even national borders, ecoregional planning also involves working across geopolitical boundaries.

The remainder of this plan focuses primarily on the establishment of natural areas as a tool. However, additional information on other tools is available from a variety of sources. The following websites are great places to start:

- The Nature Conservancy's Ecoregional Planning process:
www.nature.org/aboutus/howwework
- Northwest Land Trust Alliance:
www.lta.org/regionallta/northwest.htm
- Interagency Committee for Outdoor Recreation and the Salmon Recovery Funding Board, with information about grant opportunities:
www.iac.wa.gov
- Department of Ecology's Exploring Wetlands Stewardship: A Reference Guide for Assisting Washington Landowners:
www.ecy.wa.gov/biblio/96120.html
- Department of Fish and Wildlife's Urban Wildlife and Backyard Wildlife Sanctuary programs:
www.wa.gov/wdfw/wlm/urban/

CONSERVATION TOOLS

- Education
- Voluntary landowner actions, including ecologically sound management practices
- Public agency policies
- Acquiring lands specifically for conservation purposes: natural areas
- Restoration of degraded ecosystems
- Other land-use designations: national park, wilderness area, state park, etc.
- Laws and regulations: Endangered Species Act, Growth Management Act, etc.

Purpose of Natural Areas

In passing the Natural Area Preserves Act, the Legislature recognized that retaining lands in a natural condition benefits all citizens of the state. Natural areas conserve significant examples of terrestrial, aquatic and marine ecosystems, rare species, and rare geologic features. They are used for research and education on ecological and environmental topics. And, since they retain their natural character, natural areas serve as baselines for comparisons with managed ecosystems.

The Natural Heritage Plan focuses on designation of natural areas as a conservation tool, but it is not meant to be a complete blueprint for the conservation of the diversity of Washington's species and ecosystems. The strategy presented in this plan is intended to secure, at a minimum, representation of all the state's ecosystems and rare species within the system of natural areas. This strategy may not be adequate to ensure a species' or ecosystem's long-term conservation. A single natural area would rarely be considered adequate for any given species or ecosystem type; generally several occurrences must be protected to ensure viability. Use of more than one conservation tool may be necessary to achieve success.

SOME BENEFITS OF WASHINGTON'S NATURAL AREAS

- Contribution to conservation of
 - 53 priority animal species
 - 119 priority plant species
 - 190 ecosystem types
- All 180+ natural areas contribute to air and water quality, green space, etc.
- 100+ research projects have occurred on DNR's natural areas; at least 15 projects are currently underway

BENEFITS OF NATURAL AREAS

- Habitats for rare species
- Contribute to quality of life: clean air and water, green space, etc.
- Outdoor labs for research and education
- Reference sites for management



▲ *Top left:* Natural Areas, such as Mount Si Natural Resources Conservation Area, contribute to the overall quality of the environment by providing habitat for common and rare species, helping to maintain air and water quality, and providing green space in an increasingly developed region.

Top right: Hydrologic research at Kings Lake Bog Natural Area Preserve not only helps train tomorrow's scientists but also provides valuable information regarding how bog systems function.

Bottom left: Research at Kahlotus Ridgetop Natural Area Preserve on plant growth rates helps characterize the agricultural productivity of the soils, allowing farmers to predict crop yields more accurately.

Bottom right: A Natural Area Preserve was established to protect the best remaining population in Washington of the federally threatened Golden Paintbrush.

FACTORS USED TO ASSESS LEVEL OF PROTECTION AFFORDED BY INDIVIDUAL LAND-USE DESIGNATIONS

- Is the designation permanent? Can it be changed administratively?
- Does the designation provide an adequate level of protection? Are non-compatible uses limited?
- What criteria were used to select the area for its particular designation? How rigorous are the criteria and the process?

Types of Natural Areas Recognized in this Plan

Five land-use designations are recognized in this document as contributing to the statewide system of natural areas: Natural Area Preserves, Natural Resources Conservation Areas, Research Natural Areas, Biological Study Areas, and sites on the Washington Register of Natural Areas (see descriptions below). A majority of the sites on the register are privately owned. In addition, other privately owned lands that are managed in a manner similar to the above designations are also recognized as part of the statewide system (see Figure 4).

Many other land-use designations can contribute to the conservation of our native species and ecosystems. National park and wilderness area, for example, are designations for places where human-related impacts are minimized and where native species and ecosystems are maintained in good ecological condition. However, such areas do have major land uses in addition to their role in conservation, primarily recreation.

Other public land designations, such as state timberlands covered by a Habitat Conservation Plan or national forest, also contribute to species and ecosystem conservation. However, management for timber, forage for domestic livestock or recreation can impact native species and ecosystems.

Therefore, in passing the Natural Area Preserves Act, the Legislature emphasized that all lands within the state are "...subject to alteration by human activity..." except those lands that "...are expressly dedicated by law for preservation and protection in their natural condition..." (RCW 79.70.010). As a result, land-use designations that emphasize conservation and scientific and educational use are recognized as the core of the natural areas system.

In general, land-use designations that include other primary uses are not considered part of this statewide natural areas system, although they often contribute to conservation. Their contribution to conservation does influence the priorities established in this plan. A description of land-use designations that contribute to protection of biological diversity is available on the Natural Heritage Program's website at: www.dnr.wa.gov (click on site map/index).

Natural Area Preserves

Natural Area Preserves (NAPs) are those lands that are acquired or voluntarily registered or dedicated by the owner under the provisions of the Natural Area Preserves Act. In other words, the term is applied to those lands that have been acquired or are managed specifically for their ecological values.

Who manages them? DNR, WDFW, and the State Parks and Recreation Commission (State Parks) each manage lands that have been designated as NAPs. The Nature Conservancy also manages many sites in a manner comparable to NAP management.

Natural Resources Conservation Areas

Natural Resources Conservation Area (NRCA) is a designation unique to DNR. The NRCA Statewide Management Plan states that the primary purpose of

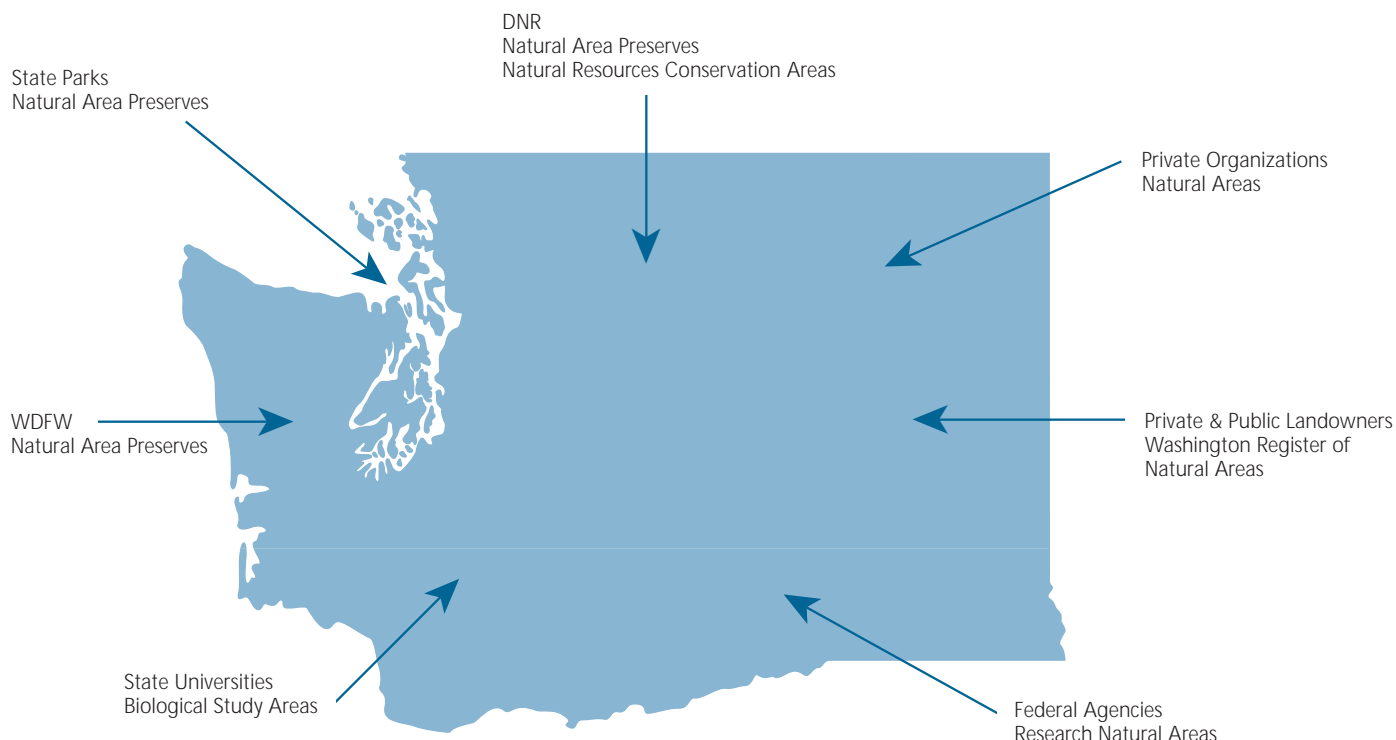


Figure 4. Statewide System of Natural Areas

NRCAs is “...to protect outstanding examples of native ecosystems and habitat for endangered, threatened and sensitive plants and animals.” The NRCA Statewide Management Plan further states that “There will be opportunities for environmental education and low-impact public uses where such uses do not adversely affect the resource values the area was intended to protect.”

Research Natural Areas

The Research Natural Area (RNA) designation is used by various federal agencies, including the U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, Department of Energy, and the U.S. Army. RNAs have essentially the same purpose and objectives as do NAPs. They also go through a fairly intensive process of review and approval, and the designation is generally considered to be permanent.

The RNA program is coordinated by the Pacific Northwest Federal Research Natural Area Committee. RNAs are established to protect various elements and are strictly managed for research and education. As such, they provide a high degree of protection and are similar to state Natural Area Preserves.

Biological Study Areas

The Biological Study Area (BSA) designation is used by universities in Washington. Washington State University has three sites with this designation that are included in the *State of Washington Natural Heritage Plan*.

Register of Natural Areas

The Washington Register of Natural Areas has been a good conservation tool to complement the establishment of Natural Area Preserves. However, because placement of a site on the register is strictly voluntary and non-binding on the part of the landowner, registry does not have the degree of permanency of the other natural area designations.

Most sites on the register fit one of two scenarios: (1) the landowner is interested in conservation, but is not interested in selling his/her property, or (2) the site would not be practical to manage as a Natural Area Preserve. For example, several sites on the register are in narrow strips along roads or fence-lines, or are small islands of native vegetation within a largely cultivated landscape. The landowner generally does not want to part with small pieces of his/her land, and DNR would have a difficult time managing a small isolated parcel in the middle of a farmer's field. In general, registration has been more effective for protection of rare species than ecosystems.

A majority of the sites on the register are owned by private individuals; a few are public lands managed by a state or federal agency.

Information regarding selection of natural areas, in particular Natural Area Preserves and sites for the Washington Register of Natural Areas, is presented in "Part 3. Implementing the Natural Areas Preserves Act."

Including Sites in the Statewide System of Natural Areas

The Natural Area Preserves Act recognizes three methods whereby lands can be included as part of the statewide system of natural areas: acquisition, registration, or dedication. The criteria used for the selection of natural areas and the processes by which decisions are made are presented in Part 3 of this document.

Land Acquisition

Acquiring land and subsequently designating it as a natural area can provide the best long-term protection for many of the state's species and ecosystems. The Natural Area Preserves and Natural Resources Conservation Areas acts authorize DNR to acquire lands with natural area qualities. However, DNR does not have the power of eminent domain; that is, it cannot obtain lands for natural areas through condemnation. Landowners must be willing sellers for DNR to purchase their land.

DNR also may purchase, lease, set aside, or exchange public land or state-owned trust lands using the criteria outlined in this document. These criteria assure that the acquired lands are deemed to be of natural area quality. The individual state land trust must receive market value for the value of their interest(s) being sold. All trust lands transactions must be approved by the Board of Natural Resources (RCW 79.70.040).

Registration

Another important tool for conservation is voluntary protection. Through participation in the Washington Register of Natural Areas, landowners can be recognized for their contribution to the protection of the state's priority species and ecosystems. DNR adopted regulations guiding this registration effort in 1983 (Ch. 332-60 WAC, see Appendix C).

Because the owner has no legal obligation to protect the priority species or ecosystem on his/her property, protection relies heavily on maintaining cooperative relationships and regular communication. Landowners remain responsible for site management, although they may voluntarily develop a management agreement with the department.

The Washington Register of Natural Areas is cooperatively managed by DNR, WDFW, and The Nature Conservancy.

Public lands can be registered under the provisions of Ch. 79.70 RCW and WAC 332-60.

Dedication

Dedication is a method used to increase protection for natural heritage resources. There are two forms of dedication. In one, the state obtains legal interest in land for preservation purposes. This form of dedication, also voluntary, differs from registration in that it entails a legal encumbrance through a contractual arrangement with the landowner. This type of protection is often referred to as a conservation easement.

The other form includes lands dedicated by public agencies through a cooperative agreement with DNR (WAC 332-60-140). The cooperative agreement must show a significant legal or administrative commitment by the managing agency to protect the priority species or ecosystem identified on the site. The owner is not required to surrender any real property interests or management authority and may place the property into an appropriate administrative category within its own statutory and regulatory authority.



▲ Loss of habitat has resulted in many rare species being found only along roadsides and fence-lines. This checker-mallow is in such a site which is included on the Washington Register of Natural Areas.